

Traceable Time as a Service (TTaaS[®]) Benefits of Extranet Integration

Ideal Candidate



"It is a truth universally acknowledged, that a cloud process distributed across many locations, must be in want of traceable synchronization"

- Q. So why is implementation of traceable synchronization so rare?
- A. It's been expensive to implement at multiple networks nodes
 Intensive to maintain once installed

Synchronized timing is an ideal candidate to be converted into an outsourced service:

– Share the infrastructure cost , reduce the hassle



Challenges to Successful Implementation of Network Traceable Time as a Service

- Validating that Traceable PTP can be received over distance via existing connectivity:
 - Define network requirements
 - Measure performance limits
- Development of software suite:
 - Maintain traceability, accuracy and granularity on a server using network feed (Keep logs to prove it)
 - Extend "Unbroken Chain of Comparisons" to extend Traceability to edge devices/IOT outside data centres







Testing and Validation



Clocks at both ends:

- NYC \rightarrow HKG \rightarrow LON
- OSI Layer 2
- Distance > 14,000 miles
- Round trip 360,000µs
- Accuracy ~4µs

Patent-pending Loop tests:

- LON \rightarrow AMS \rightarrow FRA \rightarrow PAR \rightarrow LON
- Layer 2 accuracy ~400ns
- Layer 3 accuracy ${\sim}10\mu s$
- Layer 3 uses AI clock reconstruction
- Patents pending
- Layer 2 best for long distance, DR, etc.
- Layer 3 cost effective for regional time distribution





Hoptroff Global Timing Network

Hoptroff TTaaS[®] Timing Hubs in London, New York and Tokyo enable us to integrate with network providers globally to resiliently deliver time to any major data centre in the world





Traceability: The Unbroken Value Chain of Comparisons





- Key Performance Indicators*: Source Traceability, Accuracy, Granularity, Proximity
- No hardware software only at the destination
- CREST Value: Causality, Recognition, Efficiency, Synchronization, Trust

* Patent Pending

Pulling Edge Devices Into The Traceability Chain



- We need edge device traceability:
 - Watermarking an online subscription, permission or payment
 - Applications in GDPR, security, ecommerce and banking
 - Making IoT devices' data authoritative in time and place
- Integration of the untrusted Edge into the traceability chain*:
 - Use clock offsets to reconcile edge clocks
 - Use temporal proximity to verify place
 - Use blockchain-like ledgers to render records immutable
 - Low footprint / demand on edge device & connectivity
 - Traceability counts rather than high accuracy



* Patent pending

Monitoring the Timekeeping Estate

- Key performance indicators:
 - Source Traceability (patent pending)
 - Accuracy
 - Granularity (patent pending)



HOPTROFF

LONDON



Summary



TTaaS[®] benefits over Individual Owned & Operated model

 The universally acknowledged truth, that distributed processes are in want of traceable synchronized timing, is now universally accessible...... without the cost and management commitment of owning and operating a dedicated timing infrastructure

